

# WG4 Hydrogen Network Components

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# Gas R&D decarbonization principles



Minimize stranded assets



Accelerate RNG in the immediate term



Continue energy efficiency & introduce hydrogen blending



Look to offset if needed

# Fundamentally understand infrastructure capabilities

## Infrastructure can handle pure hydrogen

- Focus on end use modifications.
- Scope 1 emission decarbonization.
- Continue with asset replacement programs.
  - Enables other markets ( i.e. transportation).
- Large scale hydrogen deployment.

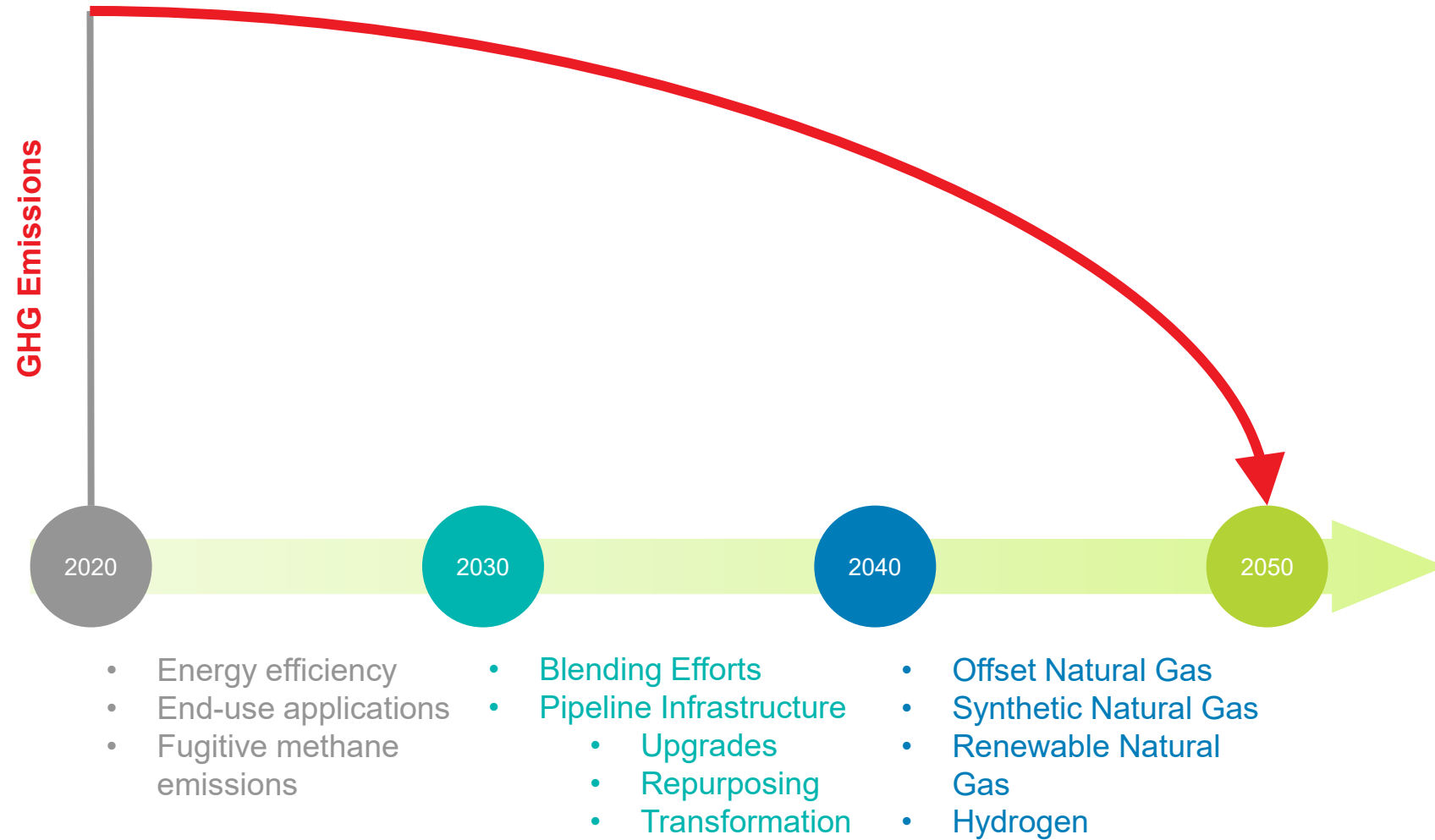
## Infrastructure can partially handle hydrogen or blends

- Need to reach significant (~80%) hydrogen blends for decarbonization.
- May require end use modifications.
  - Consider niche hydrogen applications.
- Consider specific asset families in hydrogen economy.

## Infrastructure can handle very little to no hydrogen

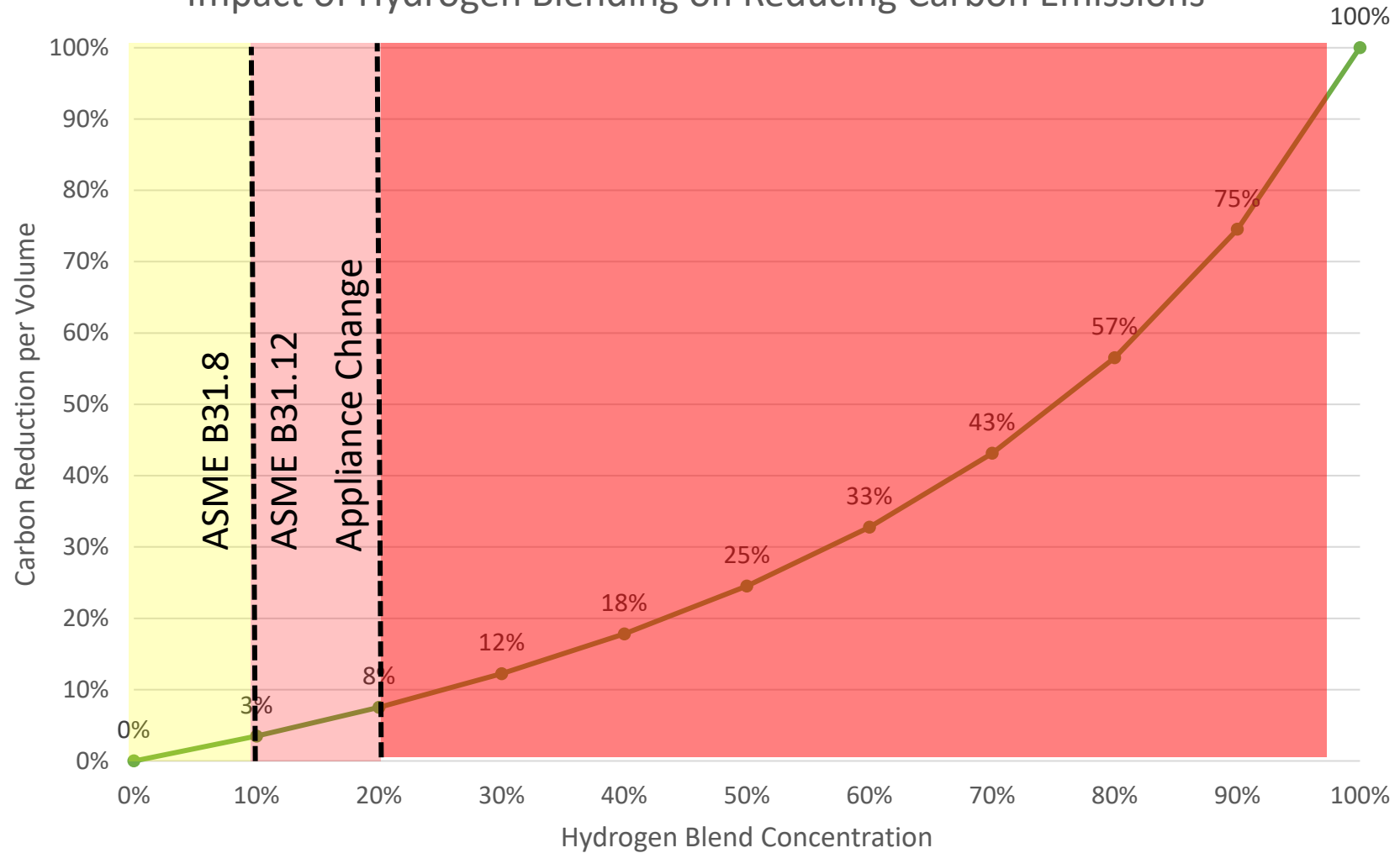
- Consider methanation as alternative.
- No end use modifications needed.
  - May require new infrastructure outside of current replacement programs or alternate carriers.

# Potential pathways to net-zero

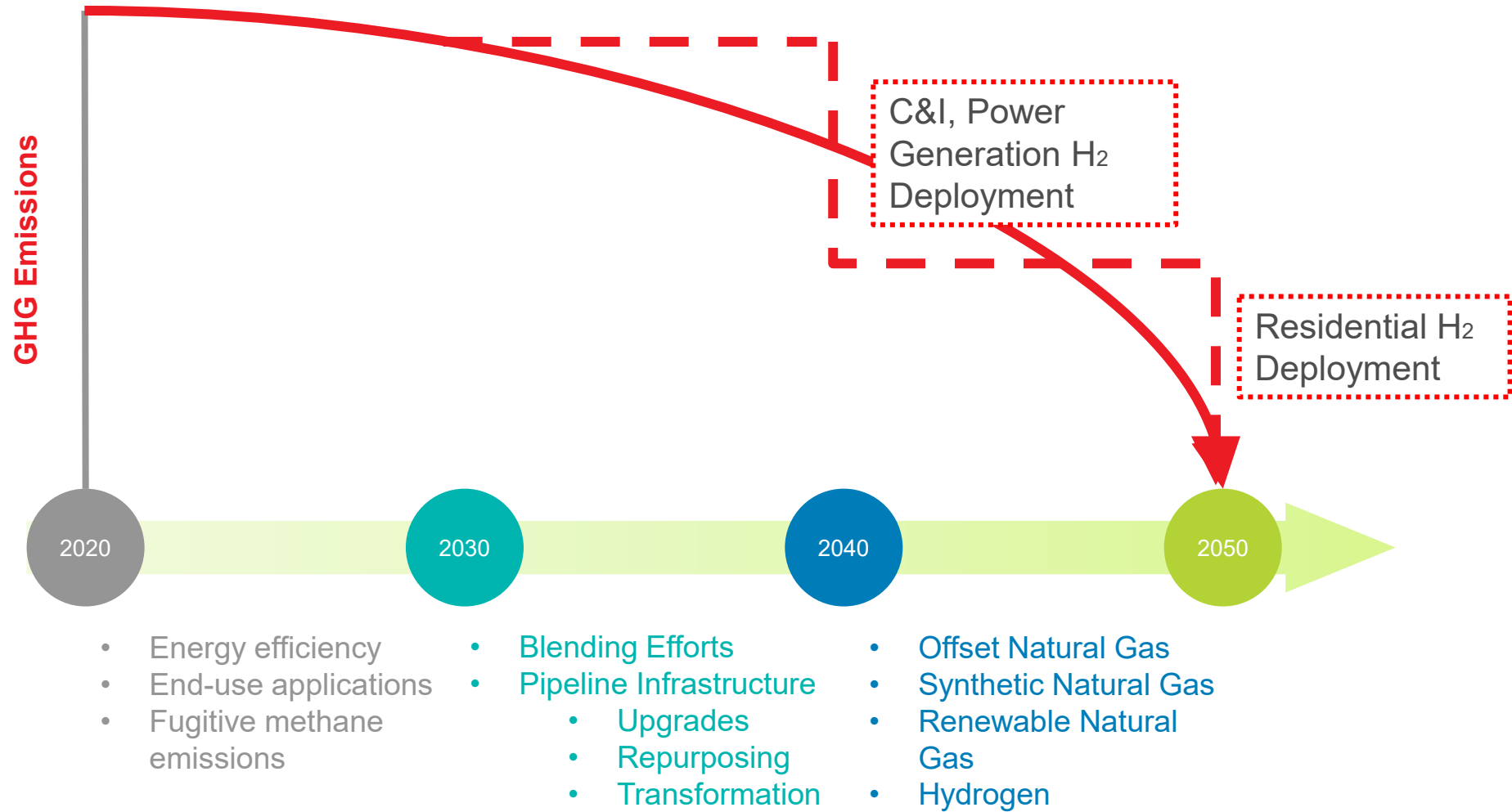


# Effect of blending hydrogen into natural gas stream

Impact of Hydrogen Blending on Reducing Carbon Emissions



# Potential pathways to net-zero



# Key Components of the Natural Gas System



Line Pipe

Valves

Regulators

Metering

Compression



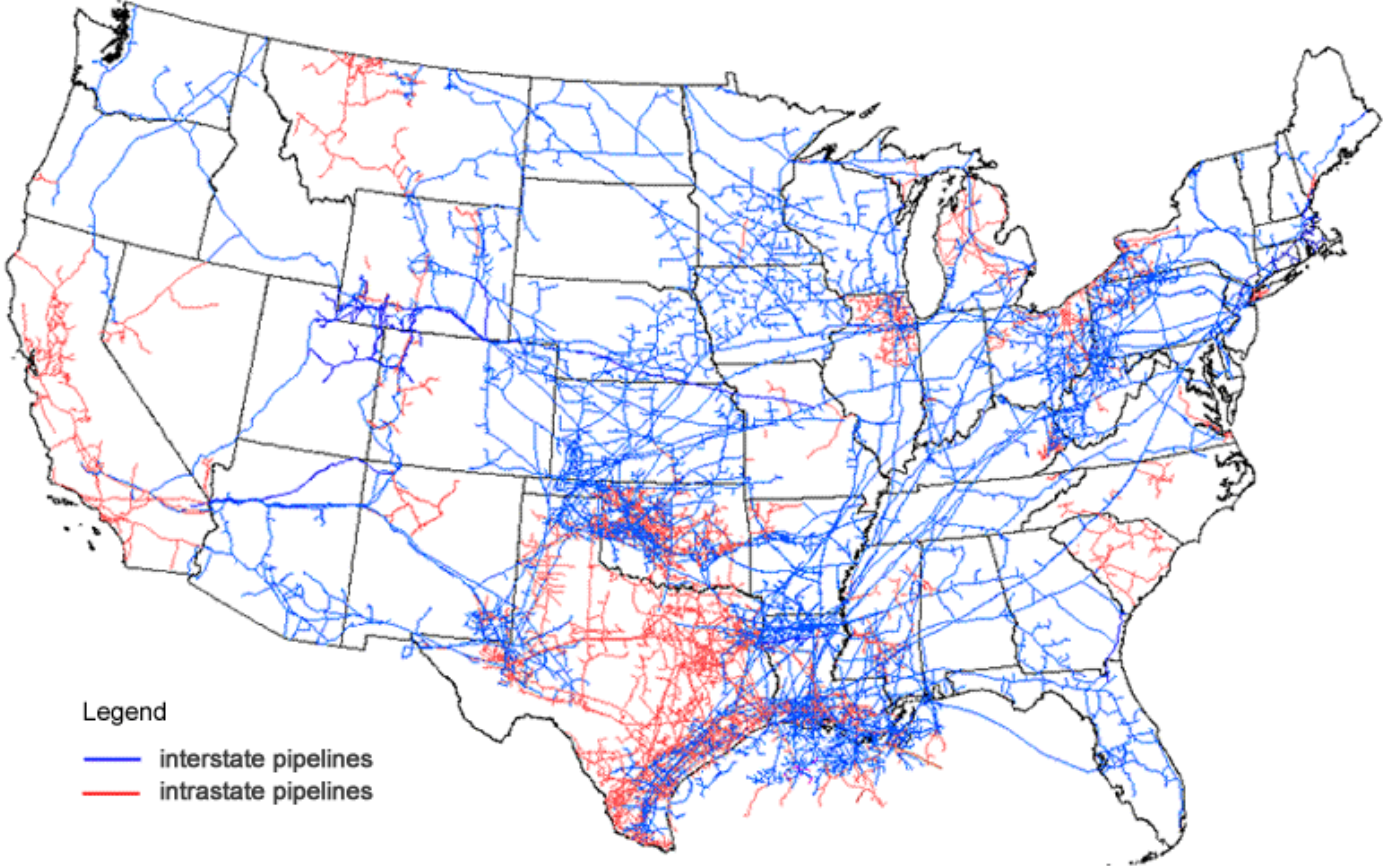
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## Appendix



# The essential need to minimize stranded assets

Map of U.S. interstate and intrastate natural gas pipelines



Source: U.S. Energy Information Administration, *About U.S. Natural Gas Pipelines*

# Hydrogen Background

Additional Delivery Volume per 1000btu

